

## Charge fluctuations in chiral models and the QCD phase transition

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Fluctuations of conserved charges are key probes of the chiral phase transition in a QCD medium. Of particular phenomenological importance are studies of such fluctuations at finite baryon density. A valuable tool for assessing critical fluctuations and the thermodynamics at non-vanishing baryon density is provided by effective chiral models.

We consider the Polyakov loop-extended two flavors chiral quark-meson model (PQM) and discuss critical phenomena related with the spontaneous breaking of chiral symmetry. The model is explored beyond the mean-field approximation in the functional renormalisation group (FRG) approach.

We formulate and solve the renormalization group flow equation for the scale-dependent thermodynamic potential in the presence of the gluonic background field at finite temperature and density [1] and determine the phase diagram of the PQM model in the FRG approach [2]. We also consider properties of the net-quark number density fluctuations as well as their higher cumulants [3] and discuss the influence of nonperturbative effects on their properties near the chiral crossover transition. With increasing net-quark number density, the higher order cumulants show a strong dependence on the chiral crossover transition. This is illustrated by exploring the ratios of moments of net-baryon number and electric charge fluctuations. We discuss their role as probes of deconfinement and the chiral phase transition in heavy ion collisions at RHIC and LHC.

[1] V. Skokov, B. Stokic, B. Friman, K. Redlich, Phys.Rev.C82:015206,2010.

[2] V. Skokov, B. Friman, K. Redlich, arXiv:1008.4570

[3] B. Friman, F. Karsch, K. Redlich, V. Skokov, arXiv:1103.3511

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